



**Recommendations for the Use of Antiretroviral Drugs in
Pregnant Women with HIV Infection and Interventions to Reduce
Perinatal HIV Transmission in the United States**

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Initial Postnatal Management of the Neonate Exposed to HIV (Last updated December 7, 2018; last reviewed December 7, 2018)

Panel's Recommendations

- A complete blood count and differential should be performed on newborns as a baseline evaluation (BIII).
- If hematologic abnormalities are identified in infants receiving prophylaxis, decisions on whether to continue infant antiretroviral (ARV) prophylaxis need to be individualized. Consultation with an expert in pediatric HIV infection is advised if early discontinuation of prophylaxis is considered (CIII).
- Decisions about the timing of subsequent monitoring of hematologic parameters in infants depend on the infant's baseline hematologic values, gestational age at birth, clinical condition, infant receipt of zidovudine, other ARV drugs, and concomitant medications; and maternal antepartum therapy (CIII).
- Hemoglobin and neutrophil counts should be remeasured 4 weeks after initiation of prophylaxis for infants who receive combination zidovudine/lamivudine-containing ARV prophylaxis regimens (AI).
- Routine measurement of serum lactate is not recommended. However, measurement of the enzyme can be considered if an infant develops severe clinical symptoms of unknown etiology (particularly neurologic symptoms) (CIII).
- Virologic tests are required to diagnose HIV infection in infants aged <18 months (see [Diagnosis of HIV Infection in Infants and Children](#)) (All).
- To prevent *Pneumocystis jirovecii* pneumonia (PCP), all infants born to women with HIV should begin PCP prophylaxis at ages 4 to 6 weeks, after completing their ARV prophylaxis regimen, unless there is adequate test information to presumptively exclude HIV infection (see the [Pediatric Opportunistic Infections Guidelines](#)) (All).
- Health care providers should routinely inquire about breastfeeding and premasturbation and advise caregivers on safe feeding options (All).

Rating of Recommendations: A = Strong; B = Moderate; C = Optional

Rating of Evidence: I = One or more randomized trials with clinical outcomes and/or validated laboratory endpoints; II = One or more well-designed, nonrandomized trials or observational cohort studies with long-term clinical outcomes; III = Expert opinion

Postnatal Management of the Neonate Exposed to HIV

Following birth, infants exposed to HIV should have a detailed physical examination, and a thorough maternal history should be obtained. Women with HIV may have coinfections with other pathogens that can be transmitted from mother to child, such as cytomegalovirus, Zika virus, herpes simplex virus, hepatitis B, hepatitis C, syphilis, toxoplasmosis, or tuberculosis. Infants born to mothers with such coinfections should undergo appropriate evaluation as indicated to exclude the possibility of transmission of additional infectious agents. The routine primary immunization schedule for children should be followed for HIV-exposed infants born to women with HIV. Modifications in the schedule may be required for infants with known HIV infection (see the [Pediatric Opportunistic Infections Guidelines](#) for more information).

Infants should be monitored for toxicities associated with the antiretroviral (ARV) drugs that they were exposed to *in utero*, or are receiving for the prevention of perinatal HIV transmission (see [Antiretroviral Management of the Newborns with Perinatal HIV Exposure and Perinatal HIV](#)). Comprehensive care also includes appropriate HIV diagnostic testing and infant feeding support to assist mothers to abstain from breastfeeding. No evidence is available to enable the Panel on Treatment of Pregnant Women with HIV Infection and Prevention of Perinatal Transmission to assess whether any changes in routine bathing practices, or timing of circumcision, are indicated for newborns with perinatal HIV exposure.

Hematologic Toxicity

A complete blood count and differential should be performed before starting newborns exposed to HIV on antiretroviral (ARV) drug prophylaxis or empiric HIV therapy (see [Antiretroviral Management of the Newborns with Perinatal HIV Exposure and Perinatal HIV](#)). Decisions about the timing of hematologic

monitoring of infants after birth depend on several factors, including **the infant's** baseline hematologic values, gestational age at birth, and clinical condition; the infant **ARV drugs and concomitant medications being administered**; and the maternal antepartum ARV drug regimen. Anemia is the primary complication seen in neonates who received a 6-week postnatal prophylaxis regimen with zidovudine. In PACTG 076, infants in the zidovudine group had lower hemoglobin levels at birth than those in the placebo group, with the maximal difference between the groups (1 g/dL) occurring at age 3 weeks.¹ The lowest mean value for hemoglobin levels (10 g/dL) occurred at age 6 weeks in the zidovudine group. By age 12 weeks, hemoglobin values in both groups were similar. No significant differences in other laboratory parameters were observed between groups. Hematologic safety **data on administration of zidovudine 4 mg/kg twice daily in infants** are limited. Some experts remeasure hemoglobin and neutrophil counts routinely after 4 weeks of zidovudine prophylaxis and/or when diagnostic HIV polymerase chain reaction (PCR) tests are obtained.

Older studies previously showed that the association seen with *in utero* exposure to maternal ARVs and anemia and/or neutropenia in infants was greater with combination ARV drug regimens than with zidovudine alone.²⁻⁴ In PACTG 316, where 77% of mothers received antenatal combination therapy, significant Grade 3 or higher anemia was noted in 13% and neutropenia in 12% of infants, respectively. Some experts recommend more intensive monitoring of hematologic tests at birth and when diagnostic HIV PCR tests are obtained in infants exposed to combination ARV drug regimens *in utero* or during the neonatal period.

Data are limited on infants receiving zidovudine in combination with other ARV drugs for prophylaxis. However, higher rates of hematologic toxicity have been observed in infants receiving zidovudine/lamivudine and other combination prophylactic regimens than in those receiving zidovudine alone or zidovudine plus nevirapine.⁵⁻⁷ Hemoglobin levels and neutrophil counts, therefore, should be remeasured 4 weeks after initiation of prophylaxis and/or at the time that diagnostic HIV PCR testing is done in infants who receive combination zidovudine/lamivudine-containing ARV prophylaxis regimens.⁸

If hematologic abnormalities are found, decisions on whether to continue infant ARV prophylaxis need to be individualized. Considerations include the extent of the abnormality, whether related symptoms are present, duration of infant prophylaxis, and risk of HIV infection (as assessed by maternal history of ARV prophylaxis, maternal viral load near delivery, and mode of delivery). **Compared with the 6-week zidovudine regimen**, a 4-week zidovudine regimen has been reported to result in earlier recovery from anemia **in HIV-exposed but** otherwise healthy infants.⁹ A 4-week (instead of a 6-week) zidovudine neonatal chemoprophylaxis regimen is recommended when a mother has received standard antiretroviral therapy (ART) during pregnancy with consistent viral suppression and no concerns related to maternal adherence; the shorter regimen will mitigate the risk of anemia in infants **born to such women and thus** at low risk of acquiring HIV (see [Antiretroviral Management of Newborns](#)).^{10,11}

Hyperlactatemia

Hyperlactatemia has been reported in infants with *in utero* exposure to ARV drugs, but it appears to be transient and, in most cases, asymptomatic.^{12,13} Routine measurement of serum lactate **to assess for potential mitochondrial toxicity** is not recommended in asymptomatic neonates because the clinical relevance of **hyperlactatemia** is unknown and **the value of lactate levels as a predictive measure of toxicity** appears poor.^{12,13} Serum lactate measurement should be considered, however, for infants who develop severe clinical symptoms of unknown etiology, particularly neurologic symptoms. ARV prophylaxis should be discontinued in infants with symptoms and if serum lactate levels are significantly abnormal (i.e., >5 mmol/L), with an expert in pediatric HIV infection consulted regarding alternate prophylaxis.

Prophylaxis Against *Pneumocystis jirovecii* Pneumonia

To prevent *Pneumocystis jirovecii* pneumonia, all infants born to women with HIV should begin trimethoprim-sulfamethoxazole (TMP-SMX) prophylaxis at age 4 to 6 weeks, after completion of the infant ARV prophylaxis regimen, unless there is adequate virologic test information to presumptively exclude HIV infection (see the [Pediatric Opportunistic Infections Guidelines](#)).¹⁴

HIV Testing of the Infant

All infants perinatally exposed to HIV require virologic HIV testing to diagnose **or exclude HIV infection**. For a detailed discussion, including types of tests and recommended HIV testing schedule, see [Diagnosis of HIV Infection in Infants and Children](#).

Infant Feeding Practices and Risk of HIV Transmission

In the United States, where safe infant feeding alternatives are available, it is recommended that women with HIV not breastfeed their infants.¹⁵ Maternal receipt of ART is likely to reduce free virus in breast milk, but the presence of cell-associated virus (intracellular HIV DNA) remains unaffected and may continue to pose a transmission risk.¹⁶ However, clinicians should be aware that some women may face considerable social, familial, and personal pressures to breastfeed despite this recommendation. (see [Guidance for Counseling and Managing Women Living with HIV in the United States Who Desire to Breastfeed](#)). It is important to address possible barriers to formula feeding beginning as early as possible in the antenatal period.

Some HIV transmission events in later infancy are thought to have resulted from infants being fed solid food that has been premasticated (prechewed or prewarmed) by caregivers with HIV. Phylogenetic comparisons of virus from cases and suspected sources and supporting clinical history and investigations identified the practice of feeding premasticated foods to infants as a potential risk factor for HIV transmission. Health care providers should routinely inquire about premastication, instruct caregivers living with HIV against this feeding practice, and advise on safer feeding options.^{17,18}

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